UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/603,924	06/24/2003	Shao-Chung Hu	JC-7109-CIP	4337

23900 7590 07/11/2006

J C PATENTS, INC.
4 VENTURE, SUITE 250
IRVINE, CA 92618

EXAMINER	
NGUYEN, THANH T	
ART UNIT	**PAPER NUMBER**
2813	

DATE MAILED: 07/11/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/603,924	HU ET AL.	
	Examiner	Art Unit	
	Thanh T. Nguyen	2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 5/23/06.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1,2,4-7 and 31-41 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1,2,4-7 and 31-41 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Request for Continued Examination

The request filed on 5/23/06 for a Request for Continued Examination (RCE) under 37 CFR 1.114 is acceptable and an RCE has been established. An action on the RCE follows.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-2, 4, 31-34, 37-40 are rejected under 35 U.S.C. 102(e) as being anticipated by Skrovan et al. (U.S. Patent No. 6,277,746).

Skrovan et al. teaches in figure 1, a method of removing contaminants from a silicon wafer after a chemical-mechanical polishing operation, comprising:

Providing a substrate (wafer) (see figure 1, col. 1, lines 24-44);

Forming a dielectric layer (insulative) over the substrate (see col. 1, lines 36-43);

Patterning the dielectric layer to form an opening (trench) that exposed a portion of the substrate (see col. 1, lines 36-43);

Forming a metallic layer (aluminum, see col. 1, lines 36-43) over the substrate so that the opening is completely filled;

Performing a CMP process to remove a portion of the metallic layer (see col. 1, lines 43-63), and

Treating the silicon wafer using an aqueous solution of ozone and providing an inertial mechanical force after the chemical-mechanical polishing process is performed, wherein the inertial mechanical force is provided by a polishing pad (col. 1, lines 64-67, col. 2, lines 1-7).

Regarding to claims 2, 32, wherein a concentration of ozone in the aqueous solution is between 10 ppm and 200 ppm (see col. 2, lines 4-7).

Regarding to claims 4, treating the substrate is performed by a water-cleaning process (see col. 2, lines 4-7).

Regarding to claim 33, 38, inertial mechanical force is proved by a polishing pad in a buffer CMP station (see col. 1, lines 64-67, col. 2, lines 1-7).

Regarding to claim 34, 39, inertial mechanical force is proved by a polishing pad in a cleaning station (see col. 1, lines 64-67, col. 2, lines 1-7).

Regarding to claim 37, 40, inertial mechanical force is proved by a polishing pad in a metal CMP station (see col. 1, lines 64-67, col. 2, lines 1-7).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 5-7, 35-36, 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Skrovan et al. (U.S. Patent No. 6,277,746) as applied to claims 1-2, 4, 31-34, 37-40 above in view of Hirabayashi et al. (U.S. Patent No. 5,575,885).

Skrovan et al. teaches all of the limitation as described in the claim invention above. However, the reference does not teach the aqueous ozone solution is catalyzed by exposure to a beam of ultraviolet light or addition of hydrogen peroxide and forming the barrier layer within the opening, and the specific inertial mechanical force.

Hirabayashi et al. teach the layer is selected from the group consisting of a low dielectric constant material layer, metallic layer and a barrier layer (copper interconnect, see col. 12, lines 35-42, meeting claims 5, 36), the aqueous ozone solution is catalyzed to produce more free ozone radicals therein (see col. 14, lines 37-42. Noted that since aqueous ozone solution is known to catalyze by hydrogen peroxide. Therefore, it would produce more free ozone radicals, meeting claim 6), the aqueous ozone solution is catalyzed by exposure to a beam or ultraviolet light or addition of hydrogen peroxide thereto (see col. 14, lines 37-42, meeting claim 7).

Therefore, it would have been obvious to a person of ordinary skill in the requisite art at the time of the invention was made would catalyzed the ozone solution by adding hydrogen peroxide in process of Small et al. as taught by Hirabayashi et al. because catalyzed the ozone

solution by adding hydrogen peroxide would produce more free radicals inside the solution and improves cleaning efficiency of the ozone solution, forming a barrier layer to prevent diffusion.

The specific mechanical force in the cleaning step is considered to involve routine optimization while has been held to be within the level of ordinary skill in the art. As noted in In re Aller, the selection of reaction parameters such as temperature and concentration would have been obvious:

> Normally, it is to be expected that a change in temperature, or in concentration, or in both, would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art...such ranges are termed Acritical ranges and the applicant has the burden of proving such criticality.... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.
> *In re Aller 105 USPQ233, 255 (CCPA 1955). See also In re Waite 77 USPQ 586 (CCPA 1948); In re Scherl 70 USPQ 204 (CCPA 1946); In re Irmscher 66 USPQ 314 (CCPA 1945); In re Norman 66 USPQ 308 (CCPA 1945); In re Swenson 56 USPQ 372 (CCPA 1942); In re Sola 25 USPQ 433 (CCPA 1935); In re Dreyfus 24 USPQ 52 (CCPA 1934).*

Therefore, one of ordinary skill in the requisite art at the time the invention was made would have used any mechanical force in the cleaning step suitable to the method in process of Skrovan et al. in order to optimize the process.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-2, 4-7, 31-41 are stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-8 of U.S. Patent No. 6,696,361. Although the conflicting claims are not identical, they are not patentably distinct from each other because both the present invention and the patent application claim a substrate (wafer) having dielectric layer, barrier layer, metal layer, CMP to remove a portion of the wafer, treating the wafer with a buffer-polishing process using an aqueous solution of ozone.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh Nguyen whose telephone number is (571) 272-1695, or by Email via address Thanh.Nguyen@uspto.gov. The examiner can normally be reached on Monday-Thursday from 6:00AM to 3:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr., can be reached on (571) 272-1702. The fax phone number for this Group is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956 (**See MPEP 203.08**).

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pairdirect.uspto.gov. Should you have questions on access to thy Private PAIR system, contact the Electronic Business center (EBC) at 866-217-9197 (toll-free).

Thanh Nguyen
Patent Examiner
Patent Examining Group 2800

TTN